Science Education Around the World

Member associations and individuals are invited to contribute to this section. Suitable items include brief accounts of specific projects of international significance, science education in a particular country, or international and regional seminars and conferences.

Science education in Malta

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Science has been part of the Maltese curriculum at least as far back as the 19th century. This does not mean that its role and importance have not undergone changes through the years. Today, in view of the new millennium, the role of science is as dynamic as ever.

Historical perspective

Physical science, mainly mechanics, was taught to boys attending technical schools back in the mid-nineteenth century (Sciberras, 1991). It was not, however, until the 1880's that science was introduced to students attending Lyceums, the then secondary schools. Topics taught were mainly mechanics, acoustics, heat, optics and simple electricity. Science also formed part of the girls' curriculum in 1878. However, it mainly included elements of history of science rather that the physical science offered to boys. Elementary science was introduced to the lower secondary forms only in 1935, while chemistry and biology were added in 1955 and 1957 respectively (Sciberras, 1991).

The sixties marked a major breakthrough for science. Not only did the curriculum reorganisation taking place give science a more prominent role in terms of time dedicated to its teaching, but educators urged teachers to include a greater element of practical work and fieldwork. This was accompanied by the government's investment in more laboratory space and equipment.

When secondary schooling was introduced for all in 1970 (Zammit Ciantar, 1991), a great shortage of science teachers arose. A series of television programmes, to compensate for this shortage, marked that era. In 1979, physics was made compulsory at secondary level and for entry into sixth form. The number of students sitting for their physics school-leaving exam increased steadily (Bonnici, 1994). However, it was not likewise in chemistry and biology. Physics is to date still compulsory in government schools. The entry requirement for sixth form, however, has been changed from physics to any one science in 1995 when the sixth form system was changed.

Science at elementary level did not experience as many developments. Although it has somehow always formed part of the curriculum, it consisted mainly of nature study, focusing on growing plants and the life cycle of a frog. Efforts at promoting this level can be traced to the 1970s with the introduction of science textbooks by Ennever and Harlen (1972). The major step towards recognition is marked by the 1988 Education Act which states 'scientific knowledge' (1988) as one of the five main aims of primary education in the Primary National Minimum curriculum. Since then, the Education Division has set up a Science Centre in 1990 together with the first series of locally produced worksheets. However, despite all these efforts, science has still kept a

secondary role in the primary curriculum.

The present education system

Children can start attending government school at the age of three. This is optional and parents can start sending their children at any time during the year after their third birthday. Kindergarten education serves to socialise children to schooling but no formal teaching as yet takes place.

Compulsory education starts at the age of five with primary school. Children spend the following five years learning English, Maltese, mathematics, religion, social studies and science, together with physical education and creativity. English is taught from the first year and is the main language used for mathematics. Every Wednesday afternoon, children are involved in craft, drama and other activities under the umbrella of creativity. Science is introduced in the third year. However, it does not get the time and emphasis it deserves since it is not examined as is the case with the other subjects.

No streaming takes place in the first four years and children are grouped according to the month of their birth. At the age of nine all children sit for common annual exams in English, Maltese, mathematics, religion and social studies set by the central education authority. Streaming is then introduced in the last two years. At the end of primary education, all students sit for a competitive national eleven plus exam. The exam consists of five papers: English, Maltese, mathematics, social studies and religion. Science does not form part of the entry requirement for secondary education. About half of the students sitting for the exam pass.

All primary children proceed to secondary school, whether they pass the 11 plus exam or not. Students spend the following five years at secondary school up to the age of sixteen when compulsory schooling ends. Those who pass the 11 plus exam go to grammar type schools known as Junior Lyceums. These schools were set up in October 1981 (Zammit Cianter, 1991) as a result of the great problems encountered when comprehensive schooling was introduced in 1970. The top 50% of students are considered to attend Junior Lyceum schools. However, one must be careful of this assumption since about 30% of Maltese children attend church or private schools. It is, therefore, difficult to compare the ability of students attending these schools with those attending Junior Lyceums. On the other hand, students who fail their 11 plus exam proceed to what are called Area Secondary Schools, similar to the secondary modern schools once present in the U.K.

All students at government secondary schools follow the same curriculum, irrelevant of whether they are Jutior Lyceum or Area Secondary Schools. A total of ten subjects are studied. Students study three languages, English, Maltese and any one subject of their choice. Integrated science is taught in the first two years. Subject choice takes place at the end of the second year. The choice falls mainly in three categories: the sciences, languages or business. All students continue to study a third language. Science is compulsory at secondary level but all students attending government schools study physics.

The end of secondary education is marked by school-leaving exams. Up to the beginning of the 1990s students still sat for the traditional Ordinary Level exams set by the Universities of London and Oxford. In 1992, the University of Malta decided to offer similar exams known as the Secondary Education Certificate (SEC) in all subjects at Ordinary level and Advanced level. As from 1994, all Maltese students sit for their SECs.

Post secondary education consists mainly of sixth-form education leading to entry into University. Technical education exists but this is mainly aimed for those students failing the educational system. The entry requirement into sixth-form is six SEC passes: English, Maltese, mathematics, one science and two other subjects. Before 1995, students studied three subjects at Advanced Level, similar to the traditional English model. In 1995, this system was discarded for one similar to the European Baccalaureate. The aim was to make education wider, reducing the amount of specialisation previously present. All students study two subjects at Advanced Level and an additional three at Intermediate, which is equivalent to one third of an advanced. Students studying sciences at Advanced Level (physics, chemistry, biology or mathematics) have to study arts subjects at Intermediate, particularly an additional language. Those opting for arts and languages have to study at least one science subject (physics, chemistry, biology or mathematics) at Intermediate. Students in the sixth-form also study a sixth subject known as 'Systems of Knowledge' which aims to give students a cultural background. Those who pass their exams and get their final matriculation certificate will proceed to University.

Provision of education in Malta

Education in Malta is not exclusively provided by government. The strongly Catholic background of the island is reflected in the numerous church schools that exist. Around 30% of Maltese children attend these schools. Privately run schools have also been recently cropping up. Government and church schools are free of charge since government heavily subsidises church schools, while private schools receive no financial help and so are extremely expensive. All primary schools are co-educational. In the case of secondary schools, government and church schools are single sex, whereas private schools are co-educational.

Church schools cater for different ages of students. Many have both primary and secondary levels, covering the whole compulsory age range. A number, however, have only secondary schools with a highly selective 11 plus exam. Entry into primary church schools is usually by lots. Many parents would like to send their children to such schools. Children living in the school's catchment area or those who are considered as 'special cases' have preference. However, children whose brothers or sisters already attend a church school are automatically admitted to that school. As already mentioned, entry to church secondary schools is through a commonly run 11 plus exam (separate from that for government schools). The order of merit is then used for choice of the preferred school. In the case of privately run schools, each school runs its own type of assessment of the students they accept.

Post-secondary education is mainly run by government but a number of church schools also have their own sixth-forms. All sixth-forms follow the same system and all students are eligible for government grants, whichever school they attend. Technical and trade schools, on the other hand, are only offered by the government.

Science in the next millennium

In preparation for the new millennium, the Maltese government has felt the need to review the educational system and update the 1988 Education Act (1988). A number of changes concerning science are being proposed in the recently published National Minimum Curriculum (1999).

Changes put forward concern both the primary and secondary education systems. The role of science has been fully consolidated at primary level by being listed as one of the core subjects. Formative assessment, similar to the other subjects, is to be done throughout the primary years. It is, however, not specified whether science would be examined in the same way as the other established subjects for entry into Junior Lyceum. A move away from one single science subject to a form of co-ordinated science is being planned at secondary level. It is believed that students would benefit more from a wider spectrum of knowledge from the different sciences than from the narrow approach to one single science (physics, chemistry or biology) currently in place. It is emphasised that this change has to take place gradually in order to ensure that educators have enough time and chance for curriculum development and preparation of teachers for its implementation.

A shift from pure 'scientific knowledge' (Education Act, 1988), to a more content-process balanced view accompanies these decisions. Science is to be portrayed as a human enterprise with its problems and uncertainties rather than the objective collection of unquestionable facts reflected by today's practice.

Conclusion

The plans made and decisions taken make the birth of the new millennium exciting for science education. The main challenge now involves the transformation of these ideas to practice. Experience has shown that the best of ideas may not reap good results if not well delivered. The success of science in Malta, therefore lies in the hands of the educational planners and practitioners.

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